

II. Remarks

Support for the various amendments made to the claims herein may be found throughout the application as filed. Claims 28-30 are cancelled herein, and claim 24 is amended herein. Claims 1-23 were cancelled previously in a Request for Continuing Examination and Preliminary Amendment and Response filed August 27, 2007. Claims 24-27 and 31-36 remain pending herein.

On December 20, 2007, an Office Action (hereafter "Office Action") was mailed rejecting all of then-pending claims 24-36 on the basis of U.S. Patent Publication No. 2004/0211966 to Guenther (hereafter "the second Guenther reference"), U.S. Patent No. 6,717,052 to Wang (hereafter "the Wanag reference"), U.S. Patent No. 6,459,160 to Goldmann (hereafter "the Goldmann reference"), the Applicant's Admitted Prior Art ("APA"), and U.S. Patent Publication No. 2003/0061693 to Kikushima (hereafter "the Kikushima reference").

The present Response and Amendment are submitted herewith in response to the Office Action.

III. Rejections of Claims Made in the Final Office Action

In the Office Action mailed December 20, 2007, the Examiner rejected claims and objected to claims on the following bases:

- (A) Claims 24, 26, 29, 32, 33 and 36 were rejected under 35 U.S.C. Section 102(e) as being anticipated by the second Guenther reference;
- (B) Claim 28 was rejected under 35 U.S.C. Section 103(a) as being unpatentable over the second Guenther reference in view of the first Guenther reference;;
- (C) Claims 25, 27, and 30 were rejected under 35 U.S.C. Section 103(a) as being unpatentable over the second Guenther reference in view of the Wang reference;
- (D) Claim 31 was rejected under 35 U.S.C. Section 103(a) as being unpatentable over the second Guenther reference in view of the Goldmann reference;
- (E) Claim 34 was rejected under 35 U.S.C. Section 103(a) as being unpatentable over the second Guenther reference in view of the APA, and

- (F) Claim 35 was rejected under 35 U.S.C. Section 103(a) as being unpatentable over the second Guenther reference in view of the Kikushima reference.

Each of the foregoing rejections and objections is responded to below -- following a review of the currently claimed invention and the cited prior art -- where each response references the letter corresponding to each rejection set forth above.

IV. Review of the Invention and Discussion of the Cited Prior Art

Before discussing the various rejections of the claims made in the Office Action, the presently claimed invention is first reviewed, followed by a discussion of the cited prior art.

Claim 24 as amended herein recites the following elements and limitations, which are to be found in the other still-pending claims, all of which depend ultimately from claim 24:

- (a) A hermetically sealed integrated circuit package, comprising:
- (b) an integrated circuit comprising a substrate having an upper surface, a perimeter being disposed upon the upper surface and defining a hermetically sealed portion therewithin, at least one circuit element being disposed within the hermetically sealed portion;
- (c) a hermetic cap comprising a top member and a gasket, the cap being configured to cover the hermetically sealed portion and form a hermetically sealed cavity thereover, the gasket comprising opposing first inner and first outer vertical sidewalls depending downwardly from the cap, the sidewalls terminating in and being separated by a bottom edge;
- (d) a bonding agent disposed between and engaging the substrate and the bottom edge to form a hermetic seal between the cap and the substrate and thereby hermetically seal the cavity;

- (e) the bonding agent further comprising opposing second inner and second outer sidewalls disposed between the substrate and the gasket, the second inner sidewall being located within the hermetically sealed portion, the second outer sidewall being located outside the hermetically sealed portion, and
- (f) a caulking agent disposed along and engaging at least one of the second inner sidewall and the second outer sidewall;
- (g) such that the caulking agent extends between and covers substantially all of and is directly in contact with at least one of the second inner sidewall and the second outer sidewall;
- (h) the caulking agent extending between the substrate and the gasket;
- (i) and being configured to seal the cavity;
- (j) and improve the hermeticity of the hermetic seal formed by the bonding agent.

Figs. 3A, 3B and 3C of the present patent application are reproduced on the following pages. The Examiner's attention is respectfully drawn to elements 22 (substrate), 26 (hermetically sealed cavity), 30 (cap), 32 (gasket), 34 (bonding agent), 36 (caulking agent), inner surface (31) and outer surface (33). Note that in Fig. 3B caulking

agent 36 extends between and covers substantially all of inner sidewall 33 and the outer sidewall 31. Note further that caulking agent 36 extends between substrate 22 and gasket 32, and that caulking agent 36 is configured to seal cavity 26. Finally, note that caulking agent 36 is configured to improve the hermeticity of the hermetic seal formed by bonding agent 34 and is essentially redundant in respect thereof.

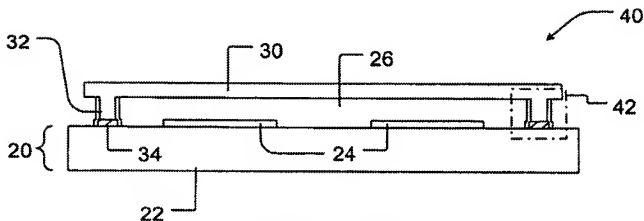


FIG. 3A

Fig. 3A of the Present Patent Application

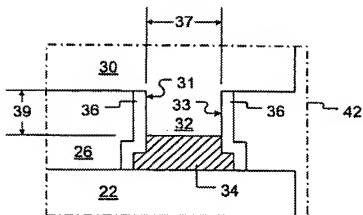


FIG. 3B

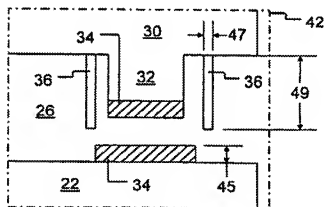


FIG. 3C

Figs. 3B and 3C of the Present Patent Application

Perusal of the first Guenther reference shows that it is entitled "Reinforcement of glass substrates in flexible devices" and discloses a reinforcement technique used in the fabrication of displays, such as organic light emissive diode (OLED) displays. A stiff reinforcement lid is mounted on a thin substrate to encapsulate OLED cells. The lid serves to reinforce the thin flexible substrate and protect it from breakage. It comprises preferably of metal or other materials that have higher stiffness and ductility than the thin substrate. The fabricated display is compatible for integration into chip cards and other flexible applications.

Fig. 4 of the first Guenther reference is presented below:

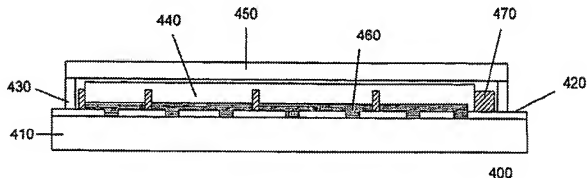


Fig. 4 of the First Guenther Reference

Pertinent excerpts from the first Guenther reference include the following portions describing Fig. 4 thereof:

[0017] FIG. 4 shows one embodiment of the invention. A thin or ultra thin glass substrate 410 is provided. The glass substrate, for example, can be made from silicate glass such as borosilicate glass. Other transparent materials, such as sodalime glass or other types of glass, are also useful. Typically, the thickness of the thin glass substrate is less than about 0.4 mm, preferably about 0.01-0.2 mm, and more preferably about 0.03-0.2 mm.

[0018] A conductive layer 420 is deposited on the substrate. The conductive layer is then patterned, selectively removing portions thereof as desired. The patterned conductive layer serves as first electrodes for the OLED cells.

[0019] In a preferred embodiment, a dielectric layer 470 is deposited on the substrate after the conductive layer is patterned. The dielectric layer, in one embodiment, comprises a photosensitive layer, such as photosensitive resist or polyimide. Other types of photosensitive layers are also useful. The thickness of the layer is typically less than 0.5 mm. The dielectric layer is patterned to form isolation pillars on the substrate, isolating the cathode materials. These pillars also support the layers above it and improve the flexibility of the device by about 10 to 30 percent.

[0020] If a resist is used, the resist is patterned by selectively exposing it to radiation through a mask and developing it to remove the exposed or unexposed portions, depending on whether a positive or negative active resist is used. If a non-photosensitive layer is used, a resist layer is deposited and patterned to serve as an etch mask for patterning the non-photosensitive layer using, for example, an anisotropic etch such as a reactive ion etch (RIE).

[0021] One or more organic functional layers 460 are formed on the substrate, covering the conductive layer. In one embodiment, the functional organic layers comprise a conjugated polymer or a low molecular material such as Alq₃. Other types of functional organic layers are also useful. Typically, the thickness of the organic layers is about 2-200 nm. The organic layer is then patterned, removing

portions thereof to expose the anode for bond pad connections.

[0022] A second conductive layer 440 is deposited over the substrate to serve as the cathode. The second conductive layer comprises a conductive material such as Ca, Mg, Ba, Ag or a mixture thereof. The top electrode strips are typically orthogonal to the bottom electrode strips. Forming top electrode strips that are diagonal to the bottom electrode strips is also useful. The intersections of the top and bottom electrode strips form organic LED pixels.

[0023] A flat lid 450 is mounted on the substrate to encapsulate the device according to one embodiment. The lid layer comprises preferably of metal (e.g. stainless steel alloy, aluminium alloy). Typically, the thickness of the lid layer 0.04-0.4 mm. The lid should have higher stiffness and ductility than the substrate, and good resistance against oxidation and chemicals. The thickness of the lid and substrate stack is preferably less than 0.6 mm so that it can be easily integrated into the chip card.

[0024] Various techniques can be used attach the lid to the substrate. In one embodiment, an adhesive 430 is used to mount the lid layer. Adhesives such as self-hardening adhesives, UV or thermal curable adhesives, or hot melt adhesives are useful. Other techniques that employ low temperature solder materials, ultrasonic bonding, or welding techniques using inductance or laser welding are also useful.

Nowhere does the first Guenther reference disclose **anything** regarding the formation of hermetic seals on an integrated circuit or on an integrated circuit substrate. Nowhere does the first Guenther reference disclose anything regarding improving the hermeticity of a seal formed by a bonding agent by applying a caulking agent to the bonding agent. Instead, the first Guenther reference merely discloses the use of an adhesive 430 to attach a lid 450 to a thin glass substrate 410. See excerpts from the first Guenther reference above.

Perusal of the second Guenther reference shows that it discloses a device having bond pads within a bond pad region, the bond pads comprising a conductive material that is stable when exposed to atmospheric constituents. The bond pads can be formed from conductive oxide materials such as indium tin oxide. A contact layer is provided to enhance the conductivity between the bond pads and the active component of the device. See the Abstract of the second Guenther reference, reproduced hereinbelow:

A reinforcement technique used in the fabrication of displays, such as organic light emissive diode (OLED) display, is disclosed. A stiff reinforcement lid is mounted on a thin substrate to encapsulate the OLED cells. The lid serves to reinforce the thin flexible substrate and protect it from breakage. It comprises preferably of metal or other materials that have higher stiffness and ductility than the thin substrate. The fabricated display is compatible for integration into chip cards and other flexible applications. *Abstract of the second Guenther reference.*

Pertinent excerpts from the second Guenther reference include the following portions describing Fig. 3 thereof:

[0011] The invention relates to improved interconnection of devices. The interconnection results in devices which are more reliable and relatively inexpensive to produce. FIG. 3 shows a device 300 in accordance with one embodiment of the invention. In one embodiment, the device comprises a substrate 301 having an active region defined thereon. The substrate comprises, for example, glass. Materials, such as silicon or other semiconductor materials, are also useful. To form flexible devices, materials such as plastics, can be used. Various other materials, which can provide sufficient mechanical stability for forming the device, are also useful.

[0012] The active region comprises one or more active components of the device. In one embodiment, the active region comprises one or more OLED cells. The active region may also comprise other types of electronic components. An OLED cell comprises one or more organic layers (polymer stack) 310 sandwiched between first and second electrodes (305 and 315). The electrodes are formed of conductive layers. The organic layers are fabricated from organic compounds that include, for example, conjugated polymers, low molecular materials, oligomers, starburst compounds or dendrimer materials. Such materials include tris-(8-hydroxyquinolate)-aluminum (Alq), poly(p-phenylene vinylene) (PPV) or polyfluorene (PF). Other types of functional organic layers, including fluorescence or phosphorescence-based layers, are also useful.

[0013] In one embodiment, at least one of the electrodes comprises a conductive material which is stable when exposed to atmospheric constituents, such as water and oxygen. In one embodiment, the first electrode comprises a conductive material that is stable when exposed to atmospheric constituents. In one embodiment, the stable conductive material comprises a conductive oxide such as indium tin oxide (ITO). Other conductive oxides such as indium zinc oxide, zinc oxide or tin oxide, or other conductive materials which are stable when exposed to atmospheric constituents are also useful. In one embodiment, the first electrode comprises a transparent conductive material. For applications which view through the substrate, the first transparent electrode is located on the substrate, as shown in FIG. 3. For applications which view through the cap, the transparent electrode is positioned on top of the organic layer 310. The first electrode serves as, for example, the anode while the second electrode serves as, for example, the cathode.

[0014] The cathodes and anodes can be patterned as

desired to form one or more OLED cells in passive display applications. For example, the cathodes and anodes are formed as strips in respective first and second directions, creating a pixelated device. Other patterns are also useful. Typically, the first and second directions are orthogonal to each other. Alternatively, the OLED display comprises an active-matrix display. The active-matrix display comprises pixels that are independently addressed by thin-film-transistors (TFTs) and capacitors formed in an electronic backplane.

[0015] In one embodiment, a cap 360 is bonded to the substrate in the cap bonding region surrounding the active region, encapsulating the OLED cells. The cap creates a cavity 345 to protect the cells from being damaged by physical contact with the cap. In one embodiment, the cap comprises a cap substrate with a sealing rim or gasket 364 formed thereon. The cap substrate can be formed from, for example, glass. Other materials which can serve as a cap substrate, such as metal or ceramic, can also be used. The sealing rim, for example, can be formed from photoresist. Other types of materials, such as silicate glass, silicon-dioxide, or ceramic can also be used. An adhesive may be used to bond the cap to the substrate. The adhesive, for example, comprises resins based on epoxy, silicone, urethane, acrylate or olefinic chemistries. The resin can be a UV or thermally curable resin. Providing a sealing rim formed from an epoxy adhesive is also useful. Alternatively, the cap is a pre-formed cap comprising, for example, pressed metal or etched glass.

[0016] The active region of the device can, for example, include shaped pillars. The shaped pillars, which comprise an undercut, are used to pattern the top electrodes. The use of shaped pillars is described in, for example, "Production of Structured Electrodes" (US 2001/0017516A1) and "Patterning of Electrodes in OLED Devices" (PCT/SG00/00134), which are herein incorporated by reference for all purposes. Alternatively or in addition to shaped pillars, spacer particles can be provided on the

substrate. The spacer particles serve to support the cap, preventing it from contacting the OLED cells. The use of spacer particles is described in, for example, "Encapsulation of Electronic Devices" (U.S. Ser. No. 09/989,362); "Improved Encapsulation of Organic LED devices" (PCT/SG99/00145); "Organic LED Device with Improved Encapsulation" (PCT/SG99/00143); and "Improved Encapsulation for Organic LED Device" (PCT/SG99/00145), which are herein incorporated by reference for all purposes.

[0017] A surface protection layer (not shown) may be provided on the substrate in the cap bonding area. The cap contacts the surface protection layer. Various layers beneath the surface protection layer, for example, metal interconnects for the electrodes and/or electrodes (e.g., ITO), are protected from damage during removal of the polymer material. The use of a surface protection layer is described in, for example, patent application titled "Encapsulation for Electroluminescent Devices" U.S. Ser. No. 10/142,208 (attorney docket no. 12205/16), which is herein incorporated by reference for all purposes.

[0018] A bond pad region is provided in which bond pads are located. In one embodiment, the bond pad region surrounds the active area and extends beyond the cap bonding region. Providing a bond pad region which surrounds the cap bonding region is also useful. A bond pad includes first (lead) and second (pad) regions. The pad region is where contact is made to, for example, driving circuitry. Typically, the lead portion extends from the pad portion toward the active region.

[0019] In accordance with the invention, the bond pads comprise a conductive material that is stable when exposed to atmospheric constituents, such as water and air. In one embodiment, the conductive material comprises a conductive oxide. For example, the conductive oxide comprises indium tin oxide, indium zinc oxide, zinc oxide or tin oxide. Other types of conductive oxides or conductive materials which are stable when exposed to atmospheric constituents are also useful.

[0020] In a preferred embodiment, the bond pads and first electrodes are formed from the same conductive layer. Forming bond pads and first electrodes from different layers and/or materials are also useful. The conductive layer that forms the bond pads and first electrodes, in one embodiment, comprises a conductive oxide which is stable conductive material. Preferably, the conductive material of the bond pads and first electrodes exhibits good adhesion to the substrate as well as to the connector coupled to the driving circuitry. This improves the reliability of the interconnection.

[0021] The lead portion of the bond pads can be directly (e.g., part of) or indirectly (e.g., separated from) the active components (e.g., electrodes). As an example, the lead portion of the bond pads which are to be coupled to the first electrode can be integrated as part of the first electrode (e.g., formed from the same layer) while the bond pads which are to be coupled to the second electrodes are indirectly coupled to the second electrodes.

[0022] In one embodiment of the invention, contact conductors 375 are provided. The contact conductors serve to electrically couple the bond pads 377 to the active components and/or enhances the connectivity therebetween. The conductor preferably comprises a conductive metal (e.g. Al, Au, Ag, Cu, Cr or Ni). Other conductive materials are also useful. The conductors comprise a dimension which is sufficient to produce the desired electrical characteristics. Typically, the thickness of the conductors is about 100-1000

nm. Other thicknesses are also useful.

[0023] In one embodiment, a protection layer 380 is provided to encapsulate the conductors, protecting them from exposure to atmospheric constituents that may cause damage or corrosion. The protection layer preferably comprises an insulating material, such as photoresist, novolak resin, polyimide or polybenzoxazole may be used. Other types of materials which protect the contact layer from the atmospheric constituents are also useful.

[0024] The contact conductors, in one embodiment, do not extend into pad portion of the bond pads. For example, the conductors contact the lead portions of the bond pads and the active components. Preferably, the contact conductors terminate sufficiently before the pad portion to enable the conductors to be completely encapsulated without covering the pad portions, allowing interconnections between the pad portions and connectors. Hence, the conductors are not exposed to detrimental reaction with atmospheric constituents such as water or oxygen.

As shown in the above excerpts from the second Guenther reference and Fig. 3 thereof reproduced hereinbelow, the second Guenther reference discloses an adhesive 364 and a protection layer 380 provided to encapsulate conductors 375 to protect conductor 375 from exposure to atmospheric constituents that may cause damage or corrosion. Indeed, reference to Fig. 3 and the above excerpts from the second Guenther reference shows that protection layer 380 is disposed over portions of conductors 375 that would otherwise be exposed to the atmosphere. Protection layer 380 incidentally engages only a very small portion of adhesive 364 (see Fig. 3 below), and has the express stated purpose of "**protecting [the conductors] from exposure to**

atmospheric constituents that may cause damage or corrosion." As disclosed and illustrated in the second Guenther reference, protection layer 380 provides no hermetic sealing function or purpose. Consequently, the structural relationship between protection layer 380 and adhesive 364 illustrated in the second Guenther reference shows that layer 380 is incapable of increasing the hermeticity of adhesive 364, even if protection layer 380 and adhesive layer 364 were somehow capable of providing a hermetic seal (which in any event they are not).

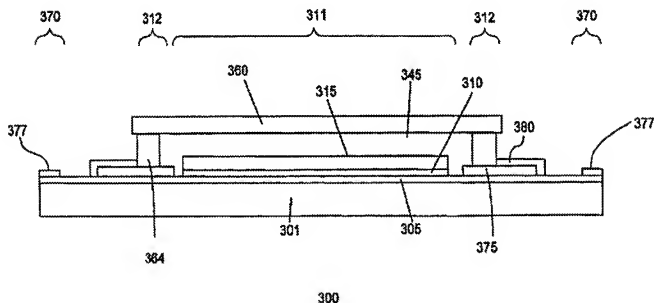


Fig. 3 of the Second Guenther Reference

Pertinent excerpts from the Wang reference include the following portions:

A housing structure used for a display device. A transparent substrate is provided with a completed luminescent device. The rim of the transparent substrate is bonded to the rim of a sealing cap to form an airtight space. A sealing structure with a first sealing layer and a second sealing layer is provided on the bonding rim between the sealing cap and the transparent substrate. The materials used to form the first sealing layer and the second sealing layer are different.
Abstract of the Wang reference.

The present invention provides a housing structure and a housing process to solve the problems found in the prior art. A transparent substrate is provided with a completed luminescent device. The rim of the transparent substrate is bonded to the rim of a sealing cap to form an airtight space. A sealing structure with a first sealing layer and a second sealing layer is provided on the bonding rim between the sealing cap and the transparent substrate. The materials used to form the first sealing layer and the second sealing layer are different.

Accordingly, it is a principal object of the invention to provide a housing structure to prolong active lifetime of display device.

It is another object of the invention to provide a housing structure to improve resistance to moisture and oxygen.

Yet another object of the invention is to provide a housing structure to improve adhesion.

These and other objects of the present invention will become readily apparent upon further review of the following

specification and drawings. Col. 2, lines 27-50 of the Wang reference.

FIG. 5C is a sectional diagram showing a third housing structure according to the second embodiment of the present invention. Unlike the first housing structure, in an organic EL element 50C, a third rib 56 is formed on the rim of the transparent substrate 42 and disposed between the first rib 52I and the second rib 52II. Therefore, the second sealing layer 46II is coated in a space between the first rib 52I and the third rib 56, and in a space between the second rib 52II and the third rib 56. Col. 5, lines 13-21 of the Wang reference.

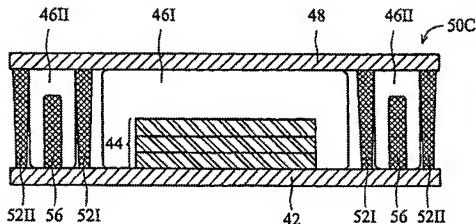


FIG. 5C

Fig. 5C of the Wang Reference

As shown in the above excerpts from the Wang reference and Fig. 5C thereof, the Wang reference discloses two different sealing layers, 46I and 46II, which are separated by ribs 52Ia and not in contact with one another. While the housing disclosed and shown in the Wang reference features first and second sealing layers 46I and 46II, the seals are not in contact with one another, are separated from one another by one or more ribs 52I, 52II and 56, and are not disclosed as forming hermetic seals. Indeed, nowhere does the Wang reference employ or disclose the terms "hermetic" or "hermetically." In addition, the Wang reference does not disclose caulk or caulking materials. Instead, the sealing materials disclosed in the Wang reference are limited to "ceramic, polymer, metal or composite" (see, for example, col. 3, lines 63-67 of the Wang reference). There is no discussion or disclosure anywhere in the Wang reference of a caulking agent improving the hermeticity of a seal provided by a bonding agent, or being disposed directly thereover. Is also noteworthy that the complicated housing sealing structure of the Wang reference consumes substantially more volume than that of the presently claimed invention, where the caulking agent is in direct contact with and overlies one or another, or both, of the sidewalls formed by the bonding agent instead of discrete and separate compartments formed by ribs having sealing layers disposed therewithin.

Perusal of the Goldmann reference shows that it discloses a package with a low-stress hermetic seal. We refer now to pertinent portions of the Goldmann reference, including Figs. 2 and 3E thereof, reproduced below:

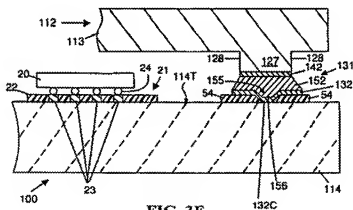
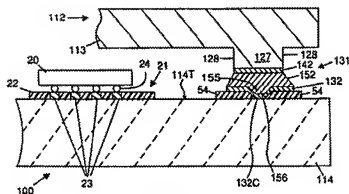


Fig. 2 and 3E of the Goldmann Reference

FIG. 2 is a schematic diagram a cross-section of a fragment of a semiconductor module 100 illustrating the structure of a preferred embodiment of this invention.

The module 100 includes a chip carrier 114 and a rectangularly shaped chip cover 112, fragments of which are shown bonded together. The chip cover 112 has a top 113 and four vertical sides 127. The sides 127, which have vertical sidewalls 128, are joined at their bottoms surfaces to the periphery of the top surface of the chip carrier 114 by a hermetic sealing structure 131. That is to say that the hermetic sealing structure 131 is formed between bottoms of the sides 127 of cover 112 and the border of the top surface of the chip carrier 114, in accordance with this invention. A via-seal 156 is formed by solder 152 which is located in a position that is remote from the high-stress edges of the lower adhesion frame 132. The solder 152 which fills a narrow via-seal channel 155 is separated from the high-stress edges of the lower adhesion frame 132 by a soft, polymeric cushion-frame 54. This separation between the solder and the high stress edges is provided to protect the chip carrier 114 from the stresses generated between the solder and the high stress edges of the lower adhesion frame 132.

Inside the cover 112, a electronic-circuit-bearing, semiconductor chip 20 is shown supported by an optional interconnect structure 21 which is formed on the surface of the chip carrier 114. In this embodiment, the interconnect structure 21 comprises an insulating layer 22 which has metal vias 23 extending from the top surface of layer 22 to contacts (not shown) in the chip carrier 114. The chip 20 (which may represent just one of a plurality of chips 20 formed in an x-y array as seen in FIG. 4E, is connected to the vias 23 in the interconnect structure 21 by connectors which are shown as C4 solder ball junctions 24 in this embodiment of the invention.

The hermetic sealing structure 131 is provided to protect the chip or a plurality of chips 20 or other elements and the circuits on the surface of the chip carrier 114 which need to be protected from the ambient atmosphere outside of the module 100. *Col. 6, line 63 through col. 7, line 35 of the Goldmann reference.*

FIG. 3E shows the device 100 of FIG. 3D after the solder frame preform 152 has been heated to its melting point so that the solder frame preform 152 melts and flows down into the upper, via-seal channel 155 (shown in FIGS. 3C and 3D) forming a solder frame 152' conforming with the surface of the metal lower adhesion frame 132. A metal cover adhesion frame 142, which is formed on the bottom of the sides 127 of the cover 112, is bonded to the solder frame 152'. The solder frame 152', which fills the via-seal channel 155 has formed a metal via-seal 156 is formed in the channel 155 by the heating of the solder frame preform 152 until it melts thereby filling the via-seal channel 155 midway between the outer and inner edges of the soft, polymeric cushion-frame 54. The solder frame 152' forms the metal-to-metal via-seal 156 in the channel 155 above the thin metal lower adhesion frame 132. Note that the metal cover adhesion frame 142 is formed on the bottom surfaces at the bases of the four sides 127 of the cap 112 confronting the solder frame preform 152 and thus provides full hermeticity. The via-seal 156, formed by the solder frame 152' filling the via-seal channel 155, is narrow and the separation provided by the soft, polymeric cushion-frame 54 protects the chip carrier 114 which is remote from the high-stress edges of the lower adhesion frame 132 as can be seen by reference to FIGS. 3A-3C and the text relative found herein below. *Col. 8, lines 1 through 25 of the Goldmann reference.*

The above excerpts and portions from the Goldmann reference show that a hermetic seal is provided between chip cover 112 and chip carrier 114, where the seal comprises solder 152, polymeric cushion frame 54, metal cover adhesion frame 142, and lower adhesion frame 132. The vertically stacked arrangement of seal components 142, 152, 132 and 54 means that failure of the seal provided by any one of such components will result in a compromised and non-hermetic seal. That is, ***none of the seal components disclosed in the Goldmann reference improves the hermeticity of any other seal component disclosed therein.*** The Goldmann reference certainly contains no disclosure of a caulking agent that acts to improve the hermeticity of any of the seal components disclosed therein.

Perusal of the APA shows that it merely discloses the state of the art regarding hermetic seal technology for integrated circuits and integrated circuit substrates. ***Nowhere does the APA disclose a caulking agent,*** let alone a caulking agent applied to a bonding agent that improves the hermeticity of the seal provided by the bonding agent. Instead, the APA discloses a conventional hermetic seal provided by a bonding agent alone. The APA consists of Fig. 2 and paragraph 3 of the present patent application, which are reproduced hereinbelow:

Figure 2 illustrates a cut-away side view of the apparatus 10 of Fig. 1 after the bonding process. The hermetically sealed cavity is indicated with reference number 26. As illustrated, bottom of the hermetically sealed cavity 26 is defined by the device chip 20 including the substrate 22 and the circuit elements 24. Top of the hermetically sealed cavity 26 is defined by the cap 30. The size of the device chip 20 and the cap 30 can vary greatly depending on implementation but can be, for example, on the order of millimeters (mm) or fractions of millimeters, for example, about 0.5 mm to 2 mm. *Paragraph 3 of the APA.*

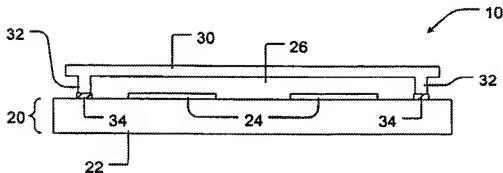


FIG. 2

Fig. 2 of the APA

Perusal of the Kikushima reference shows that it discloses a compact, thin piezo-electric resonator having high air-tightness. ***Nowhere does the Kikushima reference disclose a caulking agent***, let alone a caulking agent applied to a bonding agent that improves the hermeticity of the seal provided by the bonding agent. Instead, the Kikushima reference discloses a lone sealing material 7 that is melted to seal quartz resonator element 3 within housing 41 consisting of base 1 and lid 6. See, for example, paragraph 82 and Fig. 1(b) of the Kikushima reference reproduced hereinbelow:

[0082] As shown in these drawings, metallized electrode sections 2a and 2b having the surface plated with Ni and Au are formed at an interval d on a base 1, the base being formed by laminating two ceramic substrates 1a and 1b. Electrode sections 4a and 4b of, for example, a tuning fork type quartz resonator element 3, serving as piezo-electric resonator elements and having driving metal electrodes formed on the surfaces thereof are aligned with, and mounted on, the electrode sections 2a and 2b of this base 1. The electrode sections 4a and 4b and electrode sections 2a and 2b are electrically connected and secured with a conductive adhesive 5. Then, the metal lid 6 is aligned with the base 1. A first sealing step is carried out by melting a sealing material 7 using a beam irradiating device serving as heater such as a laser device or an electron beam device, thus sealing the quartz resonator element 3 in a housing 41 consisting of the base 1 and the lid 6. *Paragraph 82 of the Kikushima reference.*

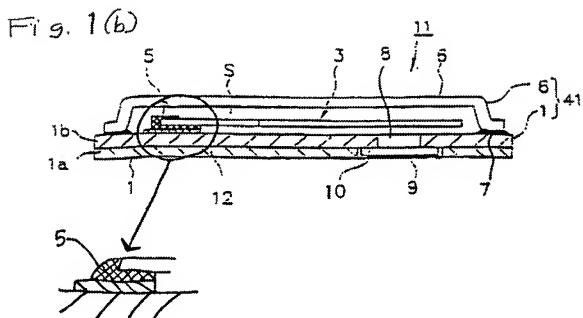


Fig. 1(b) of the Kikushima Reference

V. Response to Rejections Made in the Office Action

- (A) Claim 29 is cancelled herein, rendering moot the rejection of such claim; claims 24, 26, 32, 33 and 36 as originally presented and as amended herein are not anticipated by the second Guenther reference.

Claim 29 is cancelled herein, rendering moot the rejection of such claim under the Section 102(e). Claims 24, 26, 32, 33 and 36 as originally presented and as amended herein are not anticipated by the second Guenther reference, more about which now is said. In the Office Action, the Examiner asserted that all the elements and limitations recited in claims 24, 26, 32, 33 and 36 were disclosed in a single reference, the second Guenther reference.

Comparison of the elements and limitations appearing in claim 24 as amended herein (and which are also included in claims 26, 32, 33 and 36) to the second Guenther reference shows that the second Guenther reference does not disclose *at least* the following elements and limitations included in all such claims as they are enumerated in Section IV above:

- (a) A hermetically sealed integrated circuit package, comprising
*[the second Guenther reference discloses OLED devices,
not sealed integrated circuit packages];*

- (b) an integrated circuit comprising a substrate having an upper surface, a perimeter being disposed upon the upper surface and defining a hermetically sealed portion therewithin, at least one circuit element being disposed within the hermetically sealed portion *[the second Guenther reference discloses OLED devices, not integrated circuits];*
- (f) a caulking agent disposed along and engaging at least one of the second inner sidewall and the second outer sidewall *[the second Guenther reference discloses no caulking agents];*
- (g) such that the caulking agent extends between and covers substantially all of and is directly in contact with at least one of the second inner sidewall and the second outer sidewall *[the second Guenther reference discloses no caulking agent covering substantially all an inner outer sidewall of a bonding agent and in contact therewith];;*
- (h) the caulking agent extending between the substrate and the gasket *the second Guenther reference discloses no caulking agent extending between a substrate and a gasket];*
- (i) and being configured to seal the cavity *[the second Guenther reference discloses no caulking agent sealing a cavity, in addition to a bonding agent hermetically sealing the same cavity];*

- (j) and improve the hermeticity of the hermetic seal formed by the bonding agent *[the second Guenther reference discloses no caulking agent improving the hermeticity of a seal formed by a bonding agent]*.

It is well settled under the patent laws that for a claim to be anticipated by a cited reference, each and every element and limitation appearing in such claim must be found within the four corners of the cited reference. Reference to claims 24, 26, 32, 33 and 36 as amended herein, and as originally presented, and comparison of same to the second Guenther reference, shows clearly that none of those claims are anticipated by such reference. Accordingly, the rejection of such claims as being anticipated by the second Guenther reference was erroneously made, if not overcome by the amendments to the claims made herein. Applicants therefore respectfully request the Examiner withdraw the rejection of claims 24, 26, 32, 33 and 36 as being anticipated by the second Guenther reference.

- (B) Claim 28 is cancelled herein, rendering moot the rejection of such claim; claims 24, 26, 32, 33 and 36 as amended herein are not anticipated by the second Guenther reference.

Claim 29 is cancelled herein, rendering moot the rejection of such claim under the Section 103(a).

- (C) Claim 30 is cancelled herein, rendering moot the rejection of such claim; claims 25 and 27 as originally presented and as amended herein are not obvious over the second Guenther reference in view of the Wang reference.

Claim 30 is cancelled herein, rendering moot the rejection of such claim under the Section 103(a).

Claims 25 and 27 as originally presented and as amended herein are not obvious over the second Guenther reference in view of the Wang reference. In the Office Action, the Examiner asserted that all the second Guenther reference disclosed all elements recited in claims 24 as originally presented. As shown above in Section V(A), at least six elements and limitations recited in claim 24 as amended herein (and from which claims 25 and 27 depend) are nowhere to be found in the second Guenther reference. Moreover, claim 24 as originally presented contained at least four such elements and limitations that were nowhere to be found in the second Guenther reference.

As discussed above, the second Guenther reference discloses an adhesive 364 and a protection layer 380 provided to encapsulate conductors 375 to protect conductor 375 from exposure to atmospheric constituents that may cause damage or corrosion. Indeed, reference to Fig. 3 and the above excerpts from the second Guenther reference shows that protection layer 380 is disposed over portions of conductors 375 that would otherwise be exposed to the atmosphere. Protection layer 380 incidentally engages only a very small portion of adhesive 364 (see Fig. 3 below), and has the express stated purpose of ***"protecting [the conductors] from exposure to atmospheric constituents that may cause damage or corrosion."*** As disclosed and illustrated in the second

Guenther reference, protection layer 380 provides no hermetic sealing function or purpose. Consequently, the structural relationship between protection layer 380 and adhesive 364 illustrated in the second Guenther reference shows that layer 380 is incapable of increasing the hermeticity of adhesive 364, even if protection layer 380 and adhesive layer 364 were somehow capable of providing a hermetic seal (which in any event they are not).

Comparison of the various elements and limitations recited in claims 25 and 27 to the Wang reference yields similar results (namely, many elements and limitations recited in claims 25 and 27 are missing from the Wang reference). The Wang reference does not disclose ***at least*** the following elements and limitations included in all such claims as they are enumerated in Section IV above:

- (a) A hermetically sealed integrated circuit package, comprising
[the Wang reference does not disclose any hermetically sealed device or integrated circuit package]:
- (b) an integrated circuit comprising a substrate having an upper surface, a perimeter being disposed upon the upper surface and defining a hermetically sealed portion therewithin, at least one circuit element being disposed within the hermetically sealed portion *[the Wang reference does not disclose any integrated circuit];*
- (c) a hermetic cap comprising a top member and a gasket, the cap being configured to cover the hermetically sealed portion and form a hermetically sealed cavity thereover, the gasket

comprising opposing first inner and first outer vertical sidewalls depending downwardly from the cap, the sidewalls terminating in and being separated by a bottom edge *[the Wang reference does not disclose any hermetically sealed cap]*;

- (d) a bonding agent disposed between and engaging the substrate and the bottom edge to form a hermetic seal between the cap and the substrate and thereby hermetically seal the cavity *[the Wang reference does not disclose any hermetic seal]*;
- (e) the bonding agent further comprising opposing second inner and second outer sidewalls disposed between the substrate and the gasket, the second inner sidewall being located within the hermetically sealed portion, the second outer sidewall being located outside the hermetically sealed portion, and *[the Wang reference does not disclose any hermetically sealed portion]*
- (f) a caulking agent disposed along and engaging at least one of the second inner sidewall and the second outer sidewall *[the Wang reference does not disclose any caulking agent]*;
- (g) such that the caulking agent extends between and covers substantially all of and is directly in contact with at least one of the second inner sidewall and the second outer sidewall

[the Wang reference does not disclose any caulking agent in contact with and covering a bonding agent];

- (h) the caulking agent extending between the substrate and the gasket *[the Wang reference does not disclose any caulking agent extending between a substrate and a gasket];*
- (i) and being configured to seal the cavity *[the Wang reference does not disclose any caulking agent sealing a cavity];*
- (j) and improve the hermeticity of the hermetic seal formed by the bonding agent *[the Wang reference does not disclose any caulking agent improving the hermeticity of a hermetic seal formed by a bonding agent].*

As discussed above, the Wang reference discloses two different sealing layers, 46I and 46II, which are separated by ribs 52Ia and not in contact with one another. While the housing disclosed and shown in the Wang reference features first and second sealing layers 46I and 46II, the seals are not in contact with one another, are separated from one another by one or more ribs 52I, 52II and 56, and are not disclosed as forming hermetic seals. Indeed, nowhere does the Wang reference employ or disclose the terms "hermetic" or "hermetically." In addition, the Wang reference does not disclose caulk or caulking materials. Instead, the sealing materials disclosed in the Wang reference are limited to "ceramic, polymer, metal or composite" (see, for example, col. 3, lines 63-67 of the Wang reference). There is no discussion or disclosure anywhere in the Wang reference of a caulking agent improving the hermeticity of a seal

provided by a bonding agent, or being disposed directly thereover. Is also noteworthy that the complicated housing sealing structure of the Wang reference consumes substantially more volume than that of the presently claimed invention, where the caulking agent is in direct contact with and overlies one or another, or both, of the sidewalls formed by the bonding agent instead of discrete and separate compartments formed by ribs having sealing layers disposed therewithin.

In addition, and in view of the above discussion regarding the respective contents of the second Guenther and Wang references, it will become clear that there is no combination of the disparate elements disclosed in the two references that can produce elements that are missing from both such references, namely elements (a), (b), (f), (g), (h), (i) and (j). In other words, no combination of the various elements disclosed in the second Guenther reference and the Wang reference can produce *the at least seven elements missing therefrom* with respect to the elements and limitations recited in claims 25 and 27 as amended herein.

The Applicants have discovered that a certain novel combination of packaging, bonding, integrated circuit, sealing and semiconductor elements combined and configured in a certain order are required to produce the beneficial effects of the present invention. As demonstrated above, *many interconnected elements and limitations recited in claims 25 and 27 are neither disclosed nor suggested anywhere in the second Guenther or Wang references*, and accordingly cannot be *prima facie* obvious.

Merely asserting that "would be obvious to try" the invention by making reference to the adhesive and protection layer of the second Guenther reference, and the discrete and separated sealing layers of the

Wang reference, while essentially creating other claimed elements out of whole cloth without referring to any specific portions of the cited references to establish a motivation for combining elements or functionality disclosed therein, would not establish a *prima facie* case of obviousness. In going from the prior art to the claimed invention, one cannot base obviousness on what a person skilled in the art might try or find obvious to *try*, but rather must consider what the prior art would have lead a person skilled in the art to *do*.

There is no incentive, teaching or suggestion in the second Guenther reference or the Wang reference to produce the invention now recited in claims 25 and 27. The mere fact that the cited the second Guenther reference and the Wang reference could, with the benefit of hindsight, produce something vaguely similar to the present invention does not make the modification obvious, or suggest the desirability of the modification required to arrive at the present invention. Indeed, this conclusion is buttressed by the fact that *many* elements and limitations are missing in the second Guenther reference and the Wang reference in respect of claims 25 and 27 as presented herein, and as discussed above in detail.

It is well settled that a motivation to combine elements or limitations disclosed in disparate references *must be found from pertinent sources of information*, and that such a motivation does not arise, as here, by merely identifying a collection of disparate piece parts in a combination of references, and then asserting it would have been obvious to take such disparate elements and limitations and add many others thereto to arrive at the presently claimed invention.

There is no suggestion of what direction any experimentation should follow in the second Guenther reference or the Wang reference to

obtain the invention recited in claims 25 and 27 as amended herein. Accordingly, the result effective variables, for example forming a hermetic seal between a lid and a substrate using a bonding agent, and then applying a caulking agent to the bonding agent to improve the hermeticity thereof, are not known to be result effective. Thousands or millions of attempts at variations might be made before arriving at the desired improvement. Thus, to say that it would be obvious to read the second Guenther reference and the Wang reference and somehow arrive at the invention recited in claims 25 and 27 as they are amended herein would clearly not be the test for obviousness.

The foregoing analysis also makes it clear that there is no basis in the art for modifying the teachings of the second Guenther reference and the Wang reference to arrive at the invention recited in claims 25 and 27 as amended herein. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. The second Guenther reference ***teaches literally nothing*** regarding the problems associated with forming a hermetic seal, or maintaining the hermeticity thereof, in an integrated circuit package, and instead is directed towards solving problems arising from the breakage or flexure of thin glass substrates in OLED displays. The Wang reference teaches nothing regarding the problems associated with forming a hermetic seal of any kind, and further teaches away from the present invention by requiring the formation of separate adjoining compartments separated by ribs to hold different sealing materials. Thus, there exists no motivation to combine the teachings of the second Guenther reference and the Wang reference, and even if they did, there would still be at least seven elements missing therefrom in respect of claims 25 and 27.

When, as here, the prior art itself provides no apparent reason for one of ordinary skill in the art to make a modification or to combine references, an argument clearly does not exist that the claimed subject matter would have been obvious. Thus, an attempt to use the applicants' own disclosure as a blueprint to reconstruct in hindsight the invention now recited in claim as amended herein out of isolated teachings appearing in the prior art would clearly be improper.

The results and advantages produced by the invention set forth in claims 25 and 27 as presented herein, and of which the cited second Guenther reference and the Wang reference are devoid, cannot be ignored simply because the claim limitations might be deemed similar to the otherwise barren prior art.

The foregoing analysis also makes it clear that many limitations appearing in claims 25 and 27 as amended herein are simply not present in the second Guenther reference and the Wang reference; the analysis above shows that there are at least seven different elements and limitations recited in claims 25 and 27 as amended herein that are missing from the second Guenther and Wang references. When evaluating a claim for determining obviousness, *all* limitations of the claim must be evaluated. Under §103, the Examiner cannot in turn dissect claims 25 and 27 as they are presented herein, excise the various individual elements recited in the claims, and then declare the remaining portions of the mutilated claims to be unpatentable. The Examiner must follow the basic rule of claim interpretation of reading the claims as a whole. Accordingly, the second Guenther reference and the Wang reference may not properly be used as a basis for rejecting claims 25 and 27 36 as they are presented herein under §103.

Finally, the functions, ways and results provided by the devices and methods disclosed in the second Guenther and Wang references are completely different from those provided by the claimed invention. The device disclosed in the second Guenther reference is configured to prevent the breakage or flexure of thin glass substrates in OLED displays and to prevent corrosion of exposed conductors that might result from exposure to the ambient environment. There are no teachings therein respecting appropriate structures or operational parameters for creating redundant or improved hermetic seals in an integrated circuit package. The devices disclosed in the Wang reference are configured to protect luminary devices from ambient conditions by means of physically separated sealing layers. Thus, the devices and configurations employed in the second Guenther and Wang references, and the results provided by such devices and configurations, are quite different from those provided by the inventions set forth in claims 25 and 27 as presented herein. Such opposing functions, ways and results establish yet further that the inventions set forth in claims 25 and 27 as amended herein are not *prima facie* obvious in view of the second Guenther and Wang references.

For all the foregoing reasons and more, the presently claimed invention is not *prima facie* obvious in view of the second Guenther and Wang references.

- (D) Claim 31 as originally presented and as amended herein is not obvious over the second Guenther reference in view of the Goldmann reference.

Claim 31 as originally presented and as amended herein is not obvious over the second Guenther reference in view of the Goldmann reference. The second Guenther reference, and the many elements and limitations recited in claim 24 (which are all included in claim 31) that are missing from the second Guenther reference, are discussed in detail above.

Comparison of the various elements and limitations recited in claim 31 to the Goldmann reference yields results similar to a comparison of claim 31 to the second Guenther reference: many elements and limitations recited in claim 31 are missing therefrom. The Goldmann reference does not disclose *at least* the following elements and limitations included in claim 31 as they are enumerated in Section IV above:

- (f) a caulking agent disposed along and engaging at least one of the second inner sidewall and the second outer sidewall *[the Goldmann reference does not disclose any caulking agent];*
- (g) such that the caulking agent extends between and covers substantially all of and is directly in contact with at least one of the second inner sidewall and the second outer sidewall *[the Goldmann reference does not disclose any caulking agent in contact with and covering a bonding agent];*

- (h) the caulking agent extending between the substrate and the gasket *[the Goldmann reference does not disclose any caulking agent extending between a substrate and a gasket]*;
- (i) and being configured to seal the cavity *[the Goldmann reference does not disclose any caulking agent sealing a cavity]*;
- (j) and improve the hermeticity of the hermetic seal formed by the bonding agent *[the Goldmann reference does not disclose any caulking agent improving the hermeticity of a hermetic seal formed by a bonding agent]*.

In the Goldmann reference, a hermetic seal is provided between chip cover 112 and chip carrier 114, where the seal comprises solder 152, polymeric cushion frame 54, metal cover adhesion frame 142, and lower adhesion frame 132. The vertically stacked arrangement of seal components 142, 152, 132 and 54 means that failure of the seal provided by any one of such components will result in a compromised and non-hermetic seal. That is, none of the seal components disclosed in the Goldmann reference improves the hermeticity of any of the other seal components disclosed therein. The Goldmann reference certainly contains no disclosure of a caulking agent that acts to improve the hermeticity of any of the seal components disclosed therein.

In addition, and in view of the above discussion regarding the respective contents of the second Guenther and Goldmann references, it will become clear that there is no combination of the disparate elements disclosed in the two references that can produce elements that are

missing from both such references, namely elements (f), (g), (h), (i) and (j). In other words, no combination of the various elements disclosed in the second Guenther reference and the Goldmann reference can produce **the at least five elements missing therefrom** with respect to the elements and limitations recited in claim 31 as amended herein.

The Applicants have discovered that a certain novel combination of packaging, bonding, integrated circuit, sealing and semiconductor elements combined and configured in a certain order are required to produce the beneficial effects of the present invention. As demonstrated above, **many interconnected elements and limitations recited in claim 31 are neither disclosed nor suggested anywhere in the second Guenther and Goldmann references**, and accordingly cannot be *prima facie* obvious.

Merely asserting that "would be obvious to try" the invention by making reference to the adhesive and protection layer of the second Guenther reference, and the vertically stacked sealing layers of the Goldmann reference, while essentially creating other claimed elements out of whole cloth without referring to any specific portions of the cited references to establish a motivation for combining elements or functionality disclosed therein, would not establish a *prima facie* case of obviousness. In going from the prior art to the claimed invention, one cannot base obviousness on what a person skilled in the art might try or find obvious to try, but rather must consider what the prior art would have lead a person skilled in the art to do.

There is no incentive, teaching or suggestion in the second Guenther reference or the Goldmann reference to produce the invention now recited in claim 31. The mere fact that the cited the second Guenther reference and the Goldmann reference could, with the benefit of hindsight,

produce something vaguely similar to the present invention does not make the modification obvious, or suggest the desirability of the modification required to arrive at the present invention. Indeed, this conclusion is buttressed by the fact that *many* elements and limitations are missing in the second Guenther reference and the Goldmann reference in respect of claim 31 as presented herein, and as discussed above in detail.

It is well settled that a motivation to combine elements or limitations disclosed in disparate references *must be found from pertinent sources of information*, and that such a motivation does not arise, as here, by merely identifying a collection of disparate piece parts in a combination of references, and then asserting it would have been obvious to take such disparate elements and limitations and add many others thereto to arrive at the presently claimed invention.

There is no suggestion of what direction any experimentation should follow in the second Guenther reference or the Goldmann reference to obtain the invention recited in claim 31 as amended herein. Accordingly, the result effective variables, for example forming a hermetic seal between a lid and a substrate using a bonding agent, and then applying a caulking agent to the bonding agent to improve the hermeticity thereof, are not known to be result effective. Thousands or millions of attempts at variations might be made before arriving at the desired improvement. Thus, to say that it would be obvious to read the second Guenther reference and the Goldmann reference and somehow arrive at the invention recited in claim 31 as it is amended herein would clearly not be the test for obviousness.

The foregoing analysis also makes it clear that there is no basis in the art for modifying the teachings of the second Guenther reference and the Goldmann reference to arrive at the invention recited in claim 31 as

amended herein. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. The second Guenther reference ***teaches literally nothing*** regarding the problems associated with forming a hermetic seal, or maintaining the hermeticity thereof, in an integrated circuit package, and instead is directed towards solving problems arising from the breakage or flexure of thin glass substrates in OLED displays. The Goldmann reference teaches nothing regarding the problems associated with forming a redundant or enhanced hermetic seal of any kind, and further teaches away from the present invention by requiring the formation of vertically stacked sealing members. Thus, there exists no motivation to combine the teachings of the second Guenther reference and the Goldmann reference, and even if they did, there would still be at least five elements missing therefrom in respect of claim 31.

When, as here, the prior art itself provides no apparent reason for one of ordinary skill in the art to make a modification or to combine references, an argument clearly does not exist that the claimed subject matter would have been obvious. Thus, an attempt to use the applicants' own disclosure as a blueprint to reconstruct in hindsight the invention now recited in claim as amended herein out of isolated teachings appearing in the prior art would clearly be improper.

The results and advantages produced by the invention set forth in claim 31 as presented herein, and of which the cited second Guenther reference and the Goldmann reference are devoid, cannot be ignored simply because the claim limitations might be deemed similar to the otherwise barren prior art.

The foregoing analysis also makes it clear that many limitations appearing in claim 31 as amended herein are simply not present in the second Guenther reference and the Goldmann reference; the analysis above shows that there are at least five different elements and limitations recited in claim 31 as amended herein that are missing from the second Guenther and Goldmann references. When evaluating a claim for determining obviousness, *all* limitations of the claim must be evaluated. Under §103, the Examiner cannot in turn dissect claim 31 as it is presented herein, excise the various individual elements recited in the claim, and then declare the remaining portions of the mutilated claim to be unpatentable. The Examiner must follow the basic rule of claim interpretation of reading the claims as a whole. Accordingly, the second Guenther reference and the Goldmann reference may not properly be used as a basis for rejecting claim 31 as it is presented herein under §103.

Finally, the functions, ways and results provided by the devices and methods disclosed in the second Guenther and Goldmann references are completely different from those provided by the claimed invention. The device disclosed in the second Guenther reference is configured to prevent the breakage or flexure of thin glass substrates in OLED displays and to prevent corrosion of exposed conductors that might result from exposure to the ambient environment. There are no teachings therein respecting appropriate structures or operational parameters for creating redundant or improved hermetic seals in an integrated circuit package. The devices disclosed in the Goldmann reference are configured to provide seals by means of vertically stacked seal members which provide no redundancy or seal enhancement respecting other seal members. Thus, the devices and configurations employed in the second Guenther

and Goldmann references, and the results provided by such devices and configurations, are quite different from those provided by the inventions set forth in claim 31 as presented herein. Such opposing functions, ways and results establish yet further that the invention set forth in claim 31 as amended herein is not *prima facie* obvious in view of the second Guenther and Goldmann references.

For all the foregoing reasons and more, the presently claimed invention is not *prima facie* obvious in view of the second Guenther and Goldmann references.

- (E) Claim 34 as originally presented and as amended herein is not obvious over the second Guenther reference in view of the APA.

Claim 34 as originally presented and as amended herein is not obvious over the second Guenther reference in view of the APA. The second Guenther reference, and the many elements and limitations recited in claim 24 (which are all included in claim 34) that are missing from the second Guenther reference, are discussed in detail above.

Comparison of the various elements and limitations recited in claim 34 to the APA yields results similar to a comparison of claim 34 to the second Guenther reference: many elements and limitations recited in claim 34 are missing therefrom. The APA does not disclose *at least* the following elements and limitations included in claim 34 as they are enumerated in Section IV above:

- (f) a caulking agent disposed along and engaging at least one of the second inner sidewall and the second outer sidewall *[the APA does not disclose any caulking agent];*
- (g) such that the caulking agent extends between and covers substantially all of and is directly in contact with at least one of the second inner sidewall and the second outer sidewall *[the APA does not disclose any caulking agent in contact with and covering a bonding agent];*
- (h) the caulking agent extending between the substrate and the gasket *[the APA does not disclose any caulking agent extending between a substrate and a gasket];*

- (i) and being configured to seal the cavity *[the APA does not disclose any caulking agent sealing a cavity]*;
- (j) and improve the hermeticity of the hermetic seal formed by the bonding agent *[the APA does not disclose any caulking agent improving the hermeticity of a hermetic seal formed by a bonding agent]*.

Perusal of the APA shows that it merely discloses the state of the art regarding hermetic seal technology for integrated circuits and integrated circuit substrates. ***Nowhere does the APA disclose a caulking agent***, let alone a caulking agent applied to a bonding agent that improves the hermeticity of the seal provided by the bonding agent. Instead, the APA discloses a conventional hermetic seal provided by a bonding agent alone. The APA consists of Fig. 2 and paragraph 3 of the present patent application.

In addition, and in view of the above discussion regarding the respective contents of the second Guenther and APA references, it will become clear that there is no combination of the disparate elements disclosed in the two references that can produce elements that are missing from both such references, namely elements (f), (g), (h), (i) and (j). In other words, no combination of the various elements disclosed in the second Guenther reference and the APA can produce ***the at least five elements missing therefrom*** with respect to the elements and limitations recited in claim 34 as amended herein.

The Applicants have discovered that a certain novel combination of packaging, bonding, integrated circuit, sealing and semiconductor

elements combined and configured in a certain order are required to produce the beneficial effects of the present invention. As demonstrated above, ***many interconnected elements and limitations recited in claim 34 are neither disclosed nor suggested anywhere in the second Guenther reference and the APA***, and accordingly cannot be *prima facie* obvious.

Merely asserting that "would be obvious to try" the invention by making reference to the adhesive and protection layer of the second Guenther reference, and the conventional single bonding agent of the prior art, while essentially creating other claimed elements out of whole cloth without referring to any specific portions of the cited references to establish a motivation for combining elements or functionality disclosed therein, would not establish a *prima facie* case of obviousness. In going from the prior art to the claimed invention, one cannot base obviousness on what a person skilled in the art might try or find obvious to try, but rather must consider what the prior art would have lead a person skilled in the art to do.

There is no incentive, teaching or suggestion in the second Guenther reference or the APA to produce the invention now recited in claim 34. The mere fact that the cited the second Guenther reference and the APA could, with the benefit of hindsight, produce something vaguely similar to the present invention does not make the modification obvious, or suggest the desirability of the modification required to arrive at the present invention. Indeed, this conclusion is buttressed by the fact that ***many*** elements and limitations are missing in the second Guenther reference and the APA in respect of claim 34 as presented herein, and as discussed above in detail.

It is well settled that a motivation to combine elements or limitations disclosed in disparate references *must be found from pertinent sources of information*, and that such a motivation does not arise, as here, by merely identifying a collection of disparate piece parts in a combination of references, and then asserting it would have been obvious to take such disparate elements and limitations and add many others thereto to arrive at the presently claimed invention.

There is no suggestion of what direction any experimentation should follow in the second Guenther reference or the APA to obtain the invention recited in claim 34 as amended herein. Accordingly, the result effective variables, for example forming a hermetic seal between a lid and a substrate using a bonding agent, and then applying a caulking agent to the bonding agent to improve the hermeticity thereof, are not known to be result effective. Thousands or millions of attempts at variations might be made before arriving at the desired improvement. Thus, to say that it would be obvious to read the second Guenther reference and the APA and somehow arrive at the invention recited in claim 34 as it is amended herein would clearly not be the test for obviousness.

The foregoing analysis also makes it clear that there is no basis in the art for modifying the teachings of the second Guenther reference and the APA to arrive at the invention recited in claim 34 as amended herein. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. The second Guenther reference ***teaches literally nothing*** regarding the problems associated with forming a hermetic seal, or maintaining the hermeticity thereof, in an integrated circuit package, and instead is directed towards solving problems arising from the breakage or flexure of thin glass

substrates in OLED displays. The APA teaches nothing regarding solutions to problems associated with forming a redundant or enhanced hermetic seal of any kind. Thus, there exists no motivation to combine the teachings of the second Guenther reference and the APA, and even if they did, there would still be at least five elements missing therefrom in respect of claim 34.

When, as here, the prior art itself provides no apparent reason for one of ordinary skill in the art to make a modification or to combine references, an argument clearly does not exist that the claimed subject matter would have been obvious. Thus, an attempt to use the applicants' own disclosure as a blueprint to reconstruct in hindsight the invention now recited in claim as amended herein out of isolated teachings appearing in the prior art would clearly be improper.

The results and advantages produced by the invention set forth in claim 34 as presented herein, and of which the cited second Guenther reference and the APA are devoid, cannot be ignored simply because the claim limitations might be deemed similar to the otherwise barren prior art.

The foregoing analysis also makes it clear that many limitations appearing in claim 34 as amended herein are simply not present in the second Guenther reference and the APA; the analysis above shows that there are at least five different elements and limitations recited in claim 34 as amended herein that are missing from the second Guenther reference and the APA. When evaluating a claim for determining obviousness, *all* limitations of the claim must be evaluated. Under §103, the Examiner cannot in turn dissect claim 34 as it is presented herein, excise the various individual elements recited in the claim, and then declare the remaining portions of the mutilated claim to be unpatentable. The Examiner must follow the basic rule of claim interpretation of reading the claims as a

whole. Accordingly, the second Guenther reference and the APA may not properly be used as a basis for rejecting claim 34 as it is presented herein under §103.

Finally, the functions, ways and results provided by the devices and methods disclosed in the second Guenther reference and the APA are completely different from those provided by the claimed invention. The device disclosed in the second Guenther reference is configured to prevent the breakage or flexure of thin glass substrates in OLED displays and to prevent corrosion of exposed conductors that might result from exposure to the ambient environment. There are no teachings therein respecting appropriate structures or operational parameters for creating redundant or improved hermetic seals in an integrated circuit package. The devices disclosed in the APA are configured to provide conventional single bonding agent seals which provide no redundancy or seal enhancement respecting other seal members. Thus, the devices and configurations employed in the second Guenther reference and the APA, and the results provided by such devices and configurations, are quite different from those provided by the inventions set forth in claim 34 as presented herein. Such opposing functions, ways and results establish yet further that the invention set forth in claim 34 as amended herein is not *prima facie* obvious in view of the second Guenther reference and the APA.

For all the foregoing reasons and more, the presently claimed invention is not *prima facie* obvious in view of the second Guenther reference and the APA.

- (F) Claim 35 as originally presented and as amended herein is not obvious over the second Guenther reference in view of the Kikushima reference.

Claim 35 as originally presented and as amended herein is not obvious over the second Guenther reference in view of the Kikushima reference. The second Guenther reference, and the many elements and limitations recited in claim 24 (which are all included in claim 35) that are missing from the second Guenther reference, are discussed in detail above.

Comparison of the various elements and limitations recited in claim 35 to the Kikushima reference yields results similar to a comparison of claim 35 to the second Guenther reference: many elements and limitations recited in claim 35 are missing therefrom. The Kikushima reference does not disclose *at least* the following elements and limitations included in claim 35 as they are enumerated in Section IV above:

- (a) A hermetically sealed integrated circuit package, comprising *[the Kikushima reference does not disclose any hermetically sealed device or integrated circuit package]*:
- (b) an integrated circuit comprising a substrate having an upper surface, a perimeter being disposed upon the upper surface and defining a hermetically sealed portion therewithin, at least one circuit element being disposed within the hermetically sealed portion *[the Kikushima reference does not disclose any integrated circuit]*;

- (f) a caulking agent disposed along and engaging at least one of the second inner sidewall and the second outer sidewall *[the Kikushima reference does not disclose any caulking agent]*;
- (g) such that the caulking agent extends between and covers substantially all of and is directly in contact with at least one of the second inner sidewall and the second outer sidewall *[the Kikushima reference does not disclose any caulking agent in contact with and covering a bonding agent]*;
- (h) the caulking agent extending between the substrate and the gasket *[the Kikushima reference does not disclose any caulking agent extending between a substrate and a gasket]*;
- (i) and being configured to seal the cavity *[the Kikushima reference does not disclose any caulking agent sealing a cavity]*;
- (j) and improve the hermeticity of the hermetic seal formed by the bonding agent *[the Kikushima reference does not disclose any caulking agent improving the hermeticity of a hermetic seal formed by a bonding agent]*.

Perusal of the Kikushima reference shows that it discloses a compact, thin piezo-electric resonator having high air-tightness. ***Nowhere does the Kikushima reference disclose a caulking agent***, let alone a caulking agent applied to a bonding agent that improves the hermeticity of

the seal provided by the bonding agent. Instead, the Kikushima reference discloses a lone sealing material 7 that is melted to seal quartz resonator element 3 within housing 41 consisting of base 1 and lid 6.

In addition, and in view of the above discussion regarding the respective contents of the second Guenther and Kikushima references, it will become clear that there is no combination of the disparate elements disclosed in the two references that can produce elements that are missing from both such references, namely elements (f), (g), (h), (i) and (j). In other words, no combination of the various elements disclosed in the second Guenther reference and the Kikushima reference can produce ***the at least five elements missing therefrom*** with respect to the elements and limitations recited in claim 35 as amended herein.

The Applicants have discovered that a certain novel combination of packaging, bonding, integrated circuit, sealing and semiconductor elements combined and configured in a certain order are required to produce the beneficial effects of the present invention. As demonstrated above, ***many interconnected elements and limitations recited in claim 35 are neither disclosed nor suggested anywhere in the second Guenther reference and the Kikushima reference***, and accordingly cannot be *prima facie* obvious.

Merely asserting that "would be obvious to try" the invention by making reference to the adhesive and protection layer of the second Guenther reference, and the conventional sealing member of the Kikushima reference, while essentially creating other claimed elements out of whole cloth without referring to any specific portions of the cited references to establish a motivation for combining elements or functionality disclosed therein, would not establish a *prima facie* case of obviousness. In going from the prior art to the claimed invention, one

cannot base obviousness on what a person skilled in the art might try or find obvious to *try*, but rather must consider what the prior art would have lead a person skilled in the art to *do*.

There is no incentive, teaching or suggestion in the second Guenther reference or the Kikushima reference to produce the invention now recited in claim 34. The mere fact that the cited the second Guenther reference and the Kikushima reference could, with the benefit of hindsight, produce something vaguely similar to the present invention does not make the modification obvious, or suggest the desirability of the modification required to arrive at the present invention. Indeed, this conclusion is buttressed by the fact that *many* elements and limitations are missing in the second Guenther reference and the Kikushima reference in respect of claim 35 as presented herein, and as discussed above in detail.

It is well settled that a motivation to combine elements or limitations disclosed in disparate references *must be found from pertinent sources of information*, and that such a motivation does not arise, as here, by merely identifying a collection of disparate piece parts in a combination of references, and then asserting it would have been obvious to take such disparate elements and limitations and add many others thereto to arrive at the presently claimed invention.

There is no suggestion of what direction any experimentation should follow in the second Guenther reference or the Kikushima reference to obtain the invention recited in claim 35 as amended herein. Accordingly, the result effective variables, for example forming a hermetic seal between a lid and a substrate using a bonding agent, and then applying a caulking agent to the bonding agent to improve the hermeticity thereof, are not known to be result effective. Thousands or millions of attempts at variations might be made before arriving at the desired

improvement. Thus, to say that it would be obvious to read the second Guenther reference and the Kikushima reference and somehow arrive at the invention recited in claim 35 as it is amended herein would clearly not be the test for obviousness.

The foregoing analysis also makes it clear that there is no basis in the art for modifying the teachings of the second Guenther reference and the Kikushima reference to arrive at the invention recited in claim 35 as amended herein. Obviousness cannot be established by combining or modifying the teachings of the prior art to produce the claimed invention, absent some teaching, suggestion or incentive supporting the combination. The second Guenther reference ***teaches literally nothing*** regarding the problems associated with forming a hermetic seal, or maintaining the hermeticity thereof, in an integrated circuit package, and instead is directed towards solving problems arising from the breakage or flexure of thin glass substrates in OLED displays. The Kikushima reference teaches nothing regarding solutions to problems associated with forming a redundant or enhanced hermetic seal of any kind. Thus, there exists no motivation to combine the teachings of the second Guenther reference and the Kikushima reference, and even if they did, there would still be at least five elements missing therefrom in respect of claim 35.

When, as here, the prior art itself provides no apparent reason for one of ordinary skill in the art to make a modification or to combine references, an argument clearly does not exist that the claimed subject matter would have been obvious. Thus, an attempt to use the applicants' own disclosure as a blueprint to reconstruct in hindsight the invention now recited in claim as amended herein out of isolated teachings appearing in the prior art would clearly be improper.

The results and advantages produced by the invention set forth in claim 35 as presented herein, and of which the cited second Guenther reference and the Kikushima reference are devoid, cannot be ignored simply because the claim limitations might be deemed similar to the otherwise barren prior art.

The foregoing analysis also makes it clear that many limitations appearing in claim 35 as amended herein are simply not present in the second Guenther reference and the Kikushima reference; the analysis above shows that there are at least five different elements and limitations recited in claim 35 as amended herein that are missing from the second Guenther reference and the APA. When evaluating a claim for determining obviousness, *all* limitations of the claim must be evaluated. Under §103, the Examiner cannot in turn dissect claim 35 as it is presented herein, excise the various individual elements recited in the claim, and then declare the remaining portions of the mutilated claim to be unpatentable. The Examiner must follow the basic rule of claim interpretation of reading the claims as a whole. Accordingly, the second Guenther reference and the Kikushima reference may not properly be used as a basis for rejecting claim 35 as it is presented herein under §103.

Finally, the functions, ways and results provided by the devices and methods disclosed in the second Guenther reference and the Kikushima reference are completely different from those provided by the claimed invention. The device disclosed in the second Guenther reference is configured to prevent the breakage or flexure of thin glass substrates in OLED displays and to prevent corrosion of exposed conductors that might result from exposure to the ambient environment. There are no teachings therein respecting appropriate structures or operational parameters for creating redundant or improved hermetic seals in an integrated circuit

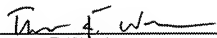
package. The devices disclosed in the Kikushima reference are configured to provide conventional single bonding agent seals which provide no redundancy or seal enhancement respecting other seal members. Thus, the devices and configurations employed in the second Guenther reference and the Kikushima reference, and the results provided by such devices and configurations, are quite different from those provided by the inventions set forth in claim 35 as presented herein. Such opposing functions, ways and results establish yet further that the invention set forth in claim 35 as amended herein is not *prima facie* obvious in view of the second Guenther reference and the Kikushima reference.

For all the foregoing reasons and more, the presently claimed invention is not *prima facie* obvious in view of the second Guenther reference and the Kikushima reference.

V. Summary

Claims 24-27 and 31-36 as amended and presented herein are pending in the present application, and are believed to be in condition for allowance. Examination of the application as amended is requested. The Examiner is respectfully requested to contact the undersigned by telephone or e-mail with any questions or comments she may have.

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